Study shows air temperature influenced African glacial movements

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Changes in air temperature, not precipitation, drove the expansion and contraction of glaciers in Africa's Rwenzori Mountains at the height of the last ice age, according to a Dartmouth-led study funded by the National Geographic Society and the National Science Foundation.

The results – along with a recent Dartmouth-led study that found air temperature also likely influenced the fluctuating size of South America's Quelccaya Ice Cap over the past millennium—support many scientists' suspicions that today's tropical glaciers are rapidly shrinking primarily because of a warming climate rather than declining snowfall or other factors. The two studies will help scientists to understand the natural variability of past climate and to predict tropical glaciers' response to future global warming.

The most recent study, which marks the first time that scientists have used the beryllium-10 surface exposure dating method to chronicle the advance and retreat of Africa's glaciers, appears in the journal *Geology*.

Africa's glaciers, which occur atop the world's highest tropical mountains, are among the most sensitive components of the world's frozen regions, but the climatic controls that influence their fluctuations are not fully understood. Dartmouth glacial geomorphologist Meredith Kelly and her team used the beryllium-10 method to determine the ages of quartz-rich boulders atop moraines in the Rwenzori Mountains on the border of Uganda and the Democratic Republic of Congo. These mountains have the most extensive glacial and moraine systems in

Africa. Moraines are ridges of sediments that mark the past positions of glaciers.

The results indicate that glaciers in equatorial East Africa advanced between 24,000 and 20,000 years ago at the coldest time of the world's last ice age. A comparison of the moraine ages with nearby climate records indicates that Rwenzori glaciers expanded contemporaneously with regionally dry, cold conditions and retreated when air temperature increased. The results suggest that, on millennial time scales, past fluctuations of Rwenzori glaciers were strongly influenced by air temperature.

Provided by Dartmouth College

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